August 28, 2006

Maine Coast Protection Initiative
GIS Capacity Building:
Lessons Learned

Introduction

Coastal areas are among the most developed in the nation. Conservation planning, from regional to local scales, is urgently needed to protect coastal and marine resources. The National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center has recently begun work on collaborative strategic coastal conservation projects. The Center's Maine Coast Protection Initiative (MCPI) serves as a prototype for the type of coastal conservation project the Center plans to undertake in other regions.

Geospatial data are a universal need among federal, state, local, and private coastal conservation organizations. The Center is working in collaboration with partners to fill that need for coastal Maine. A critical component of the Center's contribution to MCPI has been training and technical support to increase the capacity of coastal land trusts to use spatial data in planning and implementation of conservation activities. In 2006, the Center supported the establishment of a series of geographic information system (GIS) service centers that will provide GIS services to client land trusts. In 2007, the Center will continue to support the service centers with technical support and metadata training.

The lessons learned thus far from the Center's GIS capacity-building efforts for MCPI are documented here to provide information and guidance on the adaptation and continued improvement of the Center's coastal conservation initiative. This report focuses on the process of getting the GIS capacity-building efforts underway—from forming the GIS workgroup, to designing a grant program to fund service centers, to developing GIS products. Each lesson draws from the MCPI experience of what worked well and what might have been done differently. While each geographic area is unique and subsequent projects will require appropriate adjustments, this paper offers procedural lessons that may be transferred to other regions as projects like MCPI are initiated.

GIS Capacity Building Steps Completed To Date

MCPI Strategic Framework and GIS Workgroup

The MCPI Strategic Conservation Framework identifies the ability to analyze, interpret, and communicate geographic information on maps as an important tool for strategic conservation planning. The strategic framework concludes that additional or enhanced capacity for GIS and related technologies will give local land trusts consistent access to the type of assistance and products that are tailored to the needs of their organizations. For 2007, the framework set a measurable accomplishment of 75 percent of coastal land trusts having access to mapping services to support strategic conservation work. To meet this goal, the framework establishes an implementation strategy to assess GIS and other mapping technology needs of local land trusts for mapping, analysis, and planning services and to enhance capacity to address those needs over a 9 to 12 month period.

A GIS workgroup was established to move forward the GIS goals of the framework. The workgroup included representatives from land trusts, Maine State Planning Office, the Nature Conservancy (TNC), U.S. Fish and Wildlife Service (USFWS), NOAA, and the Land Trust Alliance (LTA). Initially, the

workgroup met in conjunction with a previously established Maine Land Trust Network GIS group that was focused on developing a statewide easement registry. However, given the different group goals, the GIS workgroup decided to meet independently and agreed upon the following group charge:

> *This group formed out of recognition of the many GIS-related components to the MCPI project. This group's goal is to advise MCPI on GIS issues and needs in the state to guide the development of MCPI's GIS efforts. By virtue of the goals of MCPI, this group focuses on coastal GIS issues.*

GIS Needs Assessment

With consensus among the workgroup on the need for an assessment of the land trust community's GIS needs, the Center took the lead in designing a Web-based questionnaire. Maine Coast Heritage Trust distributed the needs assessment questionnaire to 47 coastal land trusts via e-mail. About 60 percent of the land trusts responded. The needs assessment found the following:

- Sixty-five percent of the responding land trusts use GIS daily or weekly
- About 35 percent of the responding land trusts are not operating a GIS within their organizations
- About 70 percent of the GIS users reported they could benefit from capacity building to achieve a higher level of GIS performance.
- Over a third of the GIS users also reported they would use an outside GIS service to complement their existing in-house capacity
- Seventy percent of the GIS non-users said they would utilize some form of a regional GIS center that would provide on-call mapping services for a nominal fee.

GIS Grant Program

Based on the results of the needs assessment, the workgroup developed a request for proposals to distribute $70,000 in grant funds and six copies of ArcGIS 9.1, which were donated by ESRI. The GIS grant funds were to be used to support three to four GIS service centers to provide on-call, fee-based services to client organizations. The GIS service centers would be selected from existing organizations with GIS expertise, rather than funding the creation of new entities. The ArcGIS 9.1 software was made available to MCPI-supporting organizations[1] with a demonstrated need for in-house GIS software; however, preference was given to organizations applying for the service center grants.

Three organizations were selected to be service centers and awarded approximately $25,000 to support service center operations. The organizations include the following:

- Wells National Estuarine Research Reserve – serving the southern Maine region
- Sheepscot Valley Conservation Association – serving the midcoast region
- University of Maine at Machias – serving the north coast or "Downeast" region.

A detailed service agreement was required before dispersal of funds to the service centers. The service agreement required the service centers to provide GIS services, to customize a data bundle for land trusts in their areas (more in following section), to hold one training session, to collect conserved lands data according to Maine Land Trust Network standards, and to meet in a year's time with the other service centers to share information. The USFWS Gulf of Maine Program has also agreed to provide GIS services to land trusts in the midcoast region.

[1] Grant funds and software were available to those groups that had identified themselves, through a letter from their organizations, as being committed to the goals of the project by becoming Supporting Organizations.

Six copies of the ArcGIS software were awarded to four organizations:

- Sheepscot Valley Conservation Association (2)
- Coastal Mountains Land Trust (2)
- Wells National Estuarine Research Reserve (1)
- Downeast Rivers Land Trust (1)

GIS Data Bundle and Tutorial

To provide land trusts without GIS software with some basic ability to view and print maps, the GIS workgroup developed the concept of a *data bundle*. The data bundle would include frequently used conservation GIS data layers (e.g., parcel data, aerial photographs, land use, etc.) and a free data viewer. ArcReader was selected as the most appropriate software for the data bundles.

One of the requirements for the GIS service centers was to create custom ArcReader data bundles for their client organizations. The GIS workgroup was charged with delivering a base conservation bundle that included statewide conservation data in an ArcMap document to give the service centers a common starting point. The service centers are required to add local data, including digital parcel data, orthophotos, and local conserved lands data, and publish the ArcReader data bundles for their client organizations. The Center worked in collaboration with the USFWS and the GIS workgroup to produce the base data bundle and an accompanying tutorial.

Training and Technical Support

The Center provided two GIS training courses in 2006: Introduction to ArcView and Coastal Applications Using ArcGIS. A rolling enrollment was used for the training, offering space first to MCPI-supporting organizations and then opening enrollment to Maine's coastal management community.

The Center has provided limited technical support to the service centers so far, but more frequent support is anticipated for 2007.

GIS Capacity-Building Lessons Learned

Lessons on Partnering

- **Need for project partner with strong conservation GIS experience and experience with land trust operations and GIS needs**

Having project partners with strong conservation GIS experience, particularly in application of land trust activities, is important to ensure the development of a successful capacity-building program. These project partners understand how land trusts utilize GIS in their day-to-day conservation work and can help design the capacity building to specifically meet those needs. Local project partners with strong GIS experience will also build confidence among the target audience that the capacity-building program will meet their needs.

Lessons on Project Planning

- **Need to establish mission and role of workgroup early in the process**
- **GIS workgroup proved to be an effective working group to develop capacity-building grant program**

- **GIS needs assessment is important first step to characterize capacity at outset of project**
- **GIS needs assessment builds consensus for project direction among project partners**

Planning the elements of the MCPI GIS capacity building occurred almost exclusively in the GIS workgroup. This was important for building consensus among the project partners and supporting organizations, and to ensure that regional knowledge of the GIS community was incorporated as much as possible. Given the significant role of the workgroup, it was important for the success of the capacity building that the workgroup have a clear mission. Early in the planning process, the workgroup's role was confused by being combined with an existing statewide workgroup focused on a different effort (statewide easement registry). While many of the same people served on both workgroups, the function of the group improved when a separate MCPI GIS workgroup was established with a clear goal of shaping the MCPI GIS capacity-building efforts.

The GIS needs assessment was a critical initial step in the capacity-planning process. Early in the planning process, several of the workgroup members had strong ideas on what was needed to build GIS capacity, while other workgroup members were more cautious about moving forward. The needs assessment provided an opportunity to bring a common level of knowledge among the workgroup members by providing a baseline characterization of the existing capacity within the land trust community. The needs assessment also provided a forum to test the level of interest in and need for a variety of capacity-building options, including training, service centers, and data products. With the results of the assessment, the workgroup was able to quickly reach consensus on the types of capacity building to use in MCPI.

Lessons on GIS Product Development

- **Data sensitivities need to be accounted for in product development and design**
- **Internet connectivity is an important consideration in product design**
- **Product development is driven by existing levels of capacity and technology**
- **Challenge to build capacity at multiple levels**
- **Partners need to be made aware that rapid changes in GIS software may lead to limited shelf life for products**

Land trusts are often custodians of private information on location and terms of land easements and other private landowner information, such as assessed parcel values. Given the private or financial nature of this information, land trusts can be hesitant to share certain data with other organizations or make it publicly available. Data sensitivities need to be taken into account when designing GIS products and applications. For example, user accounts or other security measures may be required to restrict access to certain information.

Existing technology infrastructure, such as Internet connectivity, is another important consideration in product development. In the Downeast region of Maine, high-speed Internet connections are not readily available; therefore, Web-based mapping applications or other data access portals were not a viable option for data access and distribution. As a result, a CD-ROM–based data bundle was selected as the most appropriate mode of data distribution.

In a similar manner, product development and the capacity-building process must consider the range of existing capacities. In Maine, there were two distinct levels of capacity—those organizations that use GIS frequently and those that had little-to-no GIS experience. MCPI sought to help raise the bar for both groups, which meant developing multiple capacity-building efforts targeted for each group. For example, both introductory and intermediate GIS trainings were offered. The data bundles were developed specifically for the non-GIS user audience. Finally, the GIS service centers were planned to service both

user groups. So, while challenging, capacity building can be designed to build capacity at multiple skill levels.

In designing GIS products, partners should be made aware that rapid changes in GIS technologies and frequently updated data may lead to limited shelf life for developed products. For example, software upgrades may bring new capabilities that supersede existing products. Similarly, updates in geospatial data may require frequent product or data library updates. Making partners aware of the fast-paced nature of the GIS world will temper frustrations that could arise if partners perceive poor long-term sustainability of products because of changes in technology.

Lessons on Funding

- **Keep funding for GIS capacity separate from GIS data collection and development**
- **Build on existing organizations for service centers, rather than create new entities**
- **Service centers need funds for staff salaries**
- **Fee-based services needed for long-term service center sustainability and to minimize frivolous service requests**
- **Multi-year funding may be critical for long-term success of GIS service centers**

Geospatial data collection is an important need for land trusts, including digital parcel data, baseline assessments, and mapping of easements and other conserved lands. However, geospatial data do not raise organizations' capacity to use GIS in their conservation activities (e.g., analysis techniques for conservation planning). Therefore, in capacity-building projects, it is important to have separately funded programs for capacity building and data collection. For MCPI, the GIS capacity-building efforts were funded by the GIS grant program that prohibited the use of funds for data acquisition, while data collection was among the allowable uses of the implementation grant funds (a coincident MCPI grant program).

The GIS workgroup recognized early in the planning process that the GIS service centers had the greatest chance for success if they evolved out of existing organizations with high GIS skills, rather than funding the formation of new organizations. The needs assessment and discussion within the GIS workgroup suggested that the highest use of funds would be to support GIS staff salaries. Given the level of funds available for the service centers, the funding was enough to augment an existing organization's budget to hire additional part- to full-time staff members to accommodate the increase in GIS work or to cover other organizational costs. Besides leveraging funds with existing organizations' budgets, selecting organizations with proven operational records improves the probability of long-term sustainability of the GIS services. For MCPI, two organizations selected to be service centers were already providing some level of service to land trusts in their areas. The third service center is associated with a university GIS lab that has a stable budget to cover operational costs.

Requiring service centers to operate under a fee-for-service business model is important for two reasons. First, fee-based services will be necessary to cover staff salaries and other operational expenses after grant funding is exhausted. Second, fee-based services will force client organizations to prioritize service requests and limit frivolous service requests. A more robust requirement for the service centers would be a detailed business model that detailed how fees generated from projected services would cover the organization's operating expenses.

Conclusion

The lessons learned to date in the Center's GIS capacity-building efforts for MCPI have primarily been related to designing and implementing a grant program to build GIS capacity. As of August 2006, the service centers are just being established, so it is too early in the process to evaluate the success of the service center model. The Center will revisit the GIS lessons learned at the end of fiscal year 2007 (August 2007). These lessons learned will be valuable as the Center moves to other regions to build GIS capacity among conservation and other organizations.

Suggested Resources

- Land Trust GIS – GreenInfo Network has developed an excellent Web site that provides conservation GIS information for organizations with basic, advanced, and expert GIS skills: *http://ltgis.launchpad.onenw.org*

Figure 1: Timeline of MCPI GIS Capacity-Building Activities

Month-Year	Activities
1-2004	
2	
3	
4	
5	
6	
7	
8	
9	GIS workgroup meeting – GIS service center discussion
10	
11	
12	
1-2005	
2	
3	GIS workgroup meeting – recommend needs assessment
4	NOAA Coastal Services Center/Maine Coast Heritage Trust distribute Web-based needs assessment
5	Needs assessment report distributed
6	GIS workgroup meeting – establish workgroup mission, formulate GIS grant request for proposals (RFP), agree to move forward with GIS service centers and data bundle
7	Draft GIS grant RFP
8	
9	
10	
11	
12	GIS workgroup meeting – initial agreement reached on software for data bundle and content, refined expectations of service centers
1-2006	Revised draft GIS grant RFP
2	MCPI GIS grant RFP released
3	GIS workgroup meeting – recommendations made on grant awards
4	Grant awards announced
5	Grant funds and software distributed. Draft data bundle and tutorial circulated to GIS workgroup for review
6	
7	Final data bundle and tutorial distributed to GIS service centers
8	
9	NOAA Coastal Services Center metadata training and service center meeting
10	
11	
12	
1-2007	